CLAIMS

What is claimed is:

1. An optical navigation system for determining movement relative to a navigation terrain, said system comprising:

a first source and a second source of optical radiation for illuminating a portion of said navigation terrain, said first source differing from said second source in at least one operating parameter;

means to select said first source and said second source independently based on decision criteria; and

a detector for capturing patterns in said optical radiation subsequent to said illuminating of said navigation terrain.

2. The optical navigation system of claim 1 wherein said at least one operating parameter is selected from spatial position, beam divergence, beam convergence, angle of incidence, radiant flux, wavelength, spectral linewidth, polarization, coherence, electric current consumption, temporal modulation, and combinations of said operating parameters.

3. The optical navigation system of claim 1 wherein said first source and said second source are selected from diode emitters, LEDs, vertical-cavity surface-emitting lasers (VCSELs), laser diodes, and white light.

4. The optical navigation system of claim 1 wherein said patterns are selected from shadow, speckle, scatter, phase, and specular reflection patterns.

5. The optical navigation system of claim 4 further comprising an interferometric element for converting said phase patterns to interference patterns for capture by said detector.

6. The optical navigation system of claim 5 wherein said interferometric element is selected from shearing, Fizeau, Michelson, Mach-Zehnder, and Twyman-Green interferometric elements.

7. The optical navigation system of claim 5 wherein said interferometric element is a shearing element positioned between said navigation terrain and said detector for creating an interference overlap between said phase patterns.

8. The optical navigation system of claim 1 comprising an optical navigation device operable to move relative to said navigation terrain.

9. The optical navigation system of claim 1 wherein said means to select is selected from electric switching devices, electric resistive devices, electric modulating devices, and optical filtering devices.

10. A method for determining relative movement between an optical navigation device and a navigation terrain, said method comprising:

providing an optical navigation system comprising:

a first source and a second source of optical radiation for illuminating a portion of said navigation terrain, said first source differing from said second source in at least one operating parameter; and

a detector for capturing patterns in said optical radiation subsequent to said illuminating;

selecting initially said at least one differing operating parameter for said first and said second sources independently;

illuminating said navigation terrain portion;

capturing patterns in said optical radiation subsequent to said illuminating;

evaluating said captured patterns; and

changing said selected at least one differing operating parameter in response to decision criteria.

11. The method of claim 10 wherein said at least one differing operating parameter is selected from spatial position, beam divergence, beam convergence, angle of incidence, radiant flux, wavelength, spectral linewidth, polarization, coherence, electric current consumption, temporal modulation, and combinations of said operating parameters

12. The method of claim 10 wherein only said first source is selected.

13. The method of claim 10 wherein a plurality of said first sources and said second sources is simultaneously selected.

14. The method of claim 10 wherein said decision criteria are selected from navigability of said navigation terrain, consumption of electric current, eye safety, optical alignment tolerances, and combinations of said decision criteria.

15. The method of claim 10 wherein said changing comprises comparing said evaluated patterns relative to said decision criteria.

16. The method of claim 10 wherein said captured patterns are selected from shadow, speckle, scatter, phase, and specular reflection patterns.

17. The method of claim 10 further comprising moving an optical navigation device relative to said navigation terrain, said optical navigation device comprising said first source and said second source.

18. The method of claim 17 wherein said optical navigation device controls a positional pointer on the display of a computer.

19. The method of claim 17 wherein said evaluating comprises converting correlations between successive pairs of said captured patterns into signals corresponding to movement of said optical navigation device relative to said navigation terrain.

20. The method of claim 19 further comprising using said signals to create a surface representation of a portion of said navigation terrain represented by said captured patterns.